

A new deep-water crab from Belau, Micronesia, with a key to the Pacific species of *Chaceon* (Crustacea: Decapoda: Brachyura: Geryonidae)

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Abstract.—A new species of deep-water geryonid crab is described from Belau in Micronesia. It belongs to the *Chaceon granulatus* species group, but can be distinguished from other members of this group in possessing a relatively flatter carapace and proportionately more elongate male ambulatory legs.

Hastie & Saunders (1992) recently reported the presence of the deep-sea geryonid crab *Chaceon granulatus* (Sakai, 1978) from Belau (= Palau, see Motteler 1986) in Micronesia. The species was also featured in a 1993 stamp depicting the seafood of Palau. *Chaceon granulatus* has also been reported from various parts of central Japan to the northern part of the Ryukyus, Taiwan and possibly East China Sea (Sakai 1978, Miyake 1982, Tung et al. 1988, Ng et al. 1998). A study of these specimens from Belau, however, shows them to represent a distinct species, named here. This crab, while belonging to the *C. granulatus* species group, differs in several diagnostic carapace and ambulatory leg features.

The type specimens are deposited in the National Museum of Natural History, Smithsonian Institution, Washington (USNM). Other repositories mentioned in the text include: NNM, Nationaal Natuurhistorisch Museum, Leiden; NTOU, National Taiwan Ocean University, Keelung; ORI, Ocean Research Institute, Tokyo; RMNH, TM, Taiwan Museum, Taipei; ZRC, Zoological Reference Collection, Singapore. Measurements are expressed as width by length, in millimeters (mm).

Family Geryonidae Colosi, 1923
Chaceon micronesicus, new species
Figs. 1–3, 6A

Chaceon granulatus.—Hastie & Saunders, 1992:26 [not *Chaceon granulatus* (Sakai, 1978)].

Material examined.—Holotype: male (150.0 by 147.0 mm), Belau, Micronesia, Caroline Islands, North Pacific, coll. L. C. Hastie, 1987 (USNM 221817). Paratype: female (141.0 by 139.0 mm), same data as holotype (USNM 260858).

Description of male holotype.—Carapace semi-quadrate; dorsal surface gently convex transversely and longitudinally; gastric region inflated, granulated, rugose; branchial and posterolateral regions swollen, surfaces distinctly granulated; suborbital, subbranchial and subhepatic regions smooth; pterygostomial region gently granulose to almost smooth. Front relatively narrow, quadridentate; median teeth acutely triangular, tips slightly anterior of lateral teeth; lateral teeth triangular; distance between median teeth distinctly closer than distance between median and lateral teeth. Supraorbital margin smooth, with small submedian fissure. Infraorbital margin almost smooth or slightly granular, inner edge with sharp, triangular, anteriorly directed tooth. Anterolateral

margin convex; first, third and fifth antero-lateral teeth largest; first tooth most acute; second tooth very low; fourth tooth hardly or indiscernible. Posterolateral margin gently convex, granulose. Posterior margin of carapace subcristate, sinuous, median margin distinctly concave. Cornea well developed, pigmented. Merus of third maxilliped squarish; external angle low, rounded. Ischium subrectangular, with deep oblique median sulcus. Exopod stout, reaching half to three-quarters length of merus; flagellum long.

Chelipeds subequal in size. Outer surfaces rugose. Merus with sharp subdistal dorsal tooth. Carpus with well developed sharp tooth on distal inner margin. Fingers longer than palm, cutting edges of fingers of larger chela with basal molariform teeth; cutting edges of fingers of smaller chela with well developed teeth and denticles. Legs relatively short; last leg shortest. Dactyli of all legs slender, appearing dorsoventrally compressed, dorsal margin flattened, gently curved downwards, height at midlength subequal to or slightly shorter than width, dorsal margin with deep, distinct median longitudinal groove which may be interrupted at parts; meri relatively stout, laterally compressed, dorsal margin with low, rounded subdistal tooth (sometimes indiscernible), maximum length to width ratio of meri of first to fourth walking legs: male—4.5 and 4.6, 4.7, 4.8 and 4.9, 5.6, respectively; female—4.0 and 4.1, 4.2 and 4.3, 4.3, 4.9, respectively (each specimen is missing two legs).

Surface of anterior thoracic sternum almost smooth; sternites 1 and 2 fused, suture not discernible; sutures between sternites 2 to 6 incomplete, interrupted medially; sutures from sternite 6 onwards complete. Male abdomen triangular, sutures of segments 3–5 distinct, but segments not freely movable; telson broadly triangular, lateral margins gently concave to almost straight. Male first pleopod stout, C-shaped; distal half gently tapering towards subtruncate tip, distal part cylindrical; group of long setae

on submedian part of outer margin, distalmost surfaces covered with numerous small, sharp granules. Male second pleopod almost as long as male first pleopod, with elongate distal segment.

Female.—The female paratype differs most distinctly from the male in having the metabranchial regions more strongly rugose and granulose. Whether this is attributable to infraspecific variation cannot be ascertained. In addition, all the ambulatory legs of the female are proportionately shorter than those of the male. Such sexual dimorphism in leg proportions has already been reported for *C. granulatus* and *C. manningi* by Ng et al. (1998).

Color.—The background color of the carapace and appendages of the fresh specimens is beige-brown.

Size.—Hastie & Saunders (1992) reported the following size ranges for the material they examined: males ($n = 105$), carapace width 124–179 mm; non-ovigerous females ($n = 68$), carapace width 114–174 mm; ovigerous females ($n = 11$), carapace width 134–170 mm.

Etymology.—The new species is named after the area where it was found, i.e., Micronesia.

Remarks.—Three species are currently recognized in the *Chaceon granulatus* species group, viz. *C. granulatus* (Sakai, 1978), *C. manningi* Ng, Lee, & Yu, 1994, and *C. karubar* Manning, 1993(a) (see Ng et al. 1998). The present description of *C. micronesicus*, new species, adds a fourth member to this group. These species are all easily recognized by their distinctly granulose carapaces (especially on the metabranchial surfaces) (Fig. 4) and having the ambulatory dactyli dorso-ventrally compressed but with the height at midlength subequal to or greater than the width at midlength. In other *Chaceon* species, the height at midlength of the ambulatory dactyli is distinctly less than the width at midlength (Fig. 5). Of these species, *C. karubar* is distinct being the only species with a well developed

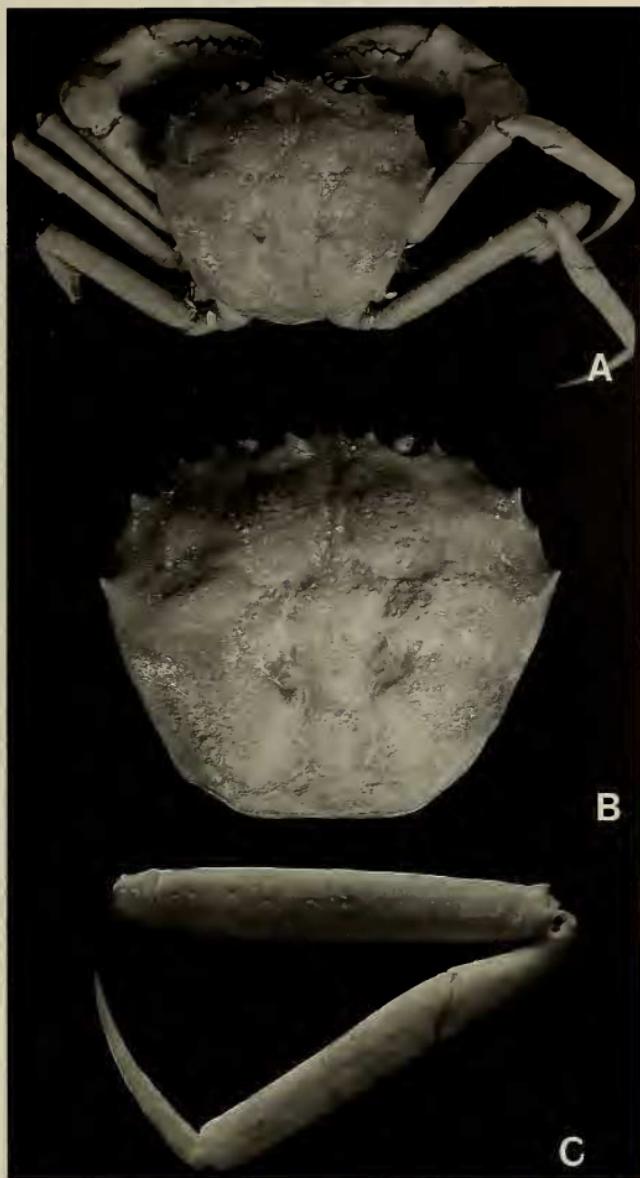


Fig. 1. *Chaceon micronesicus*, new species. Holotype male (150.0 by 147.0 mm) (USNM 221817). A, Overall view; B, Carapace; C, Fourth right ambulatory leg.

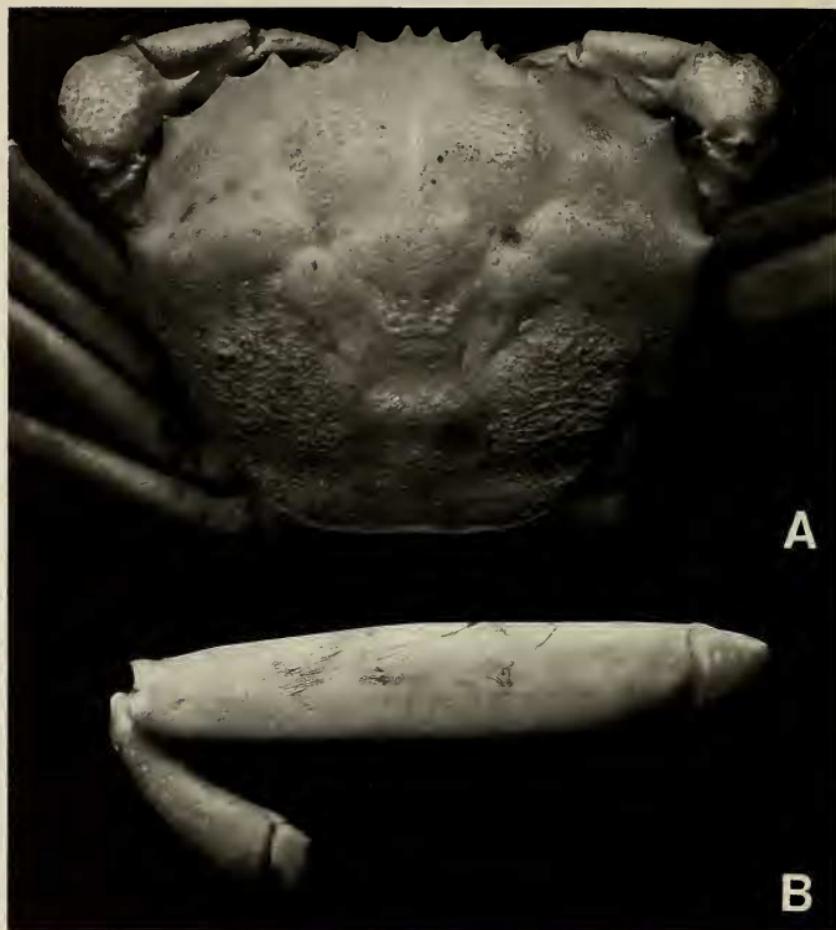


Fig. 2. *Chaceon micronesicus*, new species. Paratype female (141.0 by 139.0 mm) (USNM 260858). A, Carapace; B, Fourth right ambulatory leg.

tooth on the outer surface of the carpus of the cheliped.

Chaceon micronesicus has the flattest and least granulated carapace of all these species, with its posterolateral margins almost straight. These features are most similar to that in *C. bicolor* Manning & Holthuis, 1989, but *C. bicolor*, however, have ambulatory dactyli in which the height at midlength is distinctly less than the width at midlength. In addition, the merus of the fifth ambulatory leg is proportionately shorter

and the anterolateral teeth are also more spiniform. The relatively elongate proportions of the last male ambulatory merus allies *C. micronesicus* with *C. manningi*, but the latter species has a distinctly more swollen and granulose carapace (Fig. 5). The four frontal teeth of *C. granulatus*, *C. karubar* and *C. manningi* are all directed distinctly anteriorly, but, in *C. micronesicus*, the lateral teeth are distinctly directed obliquely outwards. The male first pleopod of *C. micronesicus* most closely resembles that of *C. manningi*.

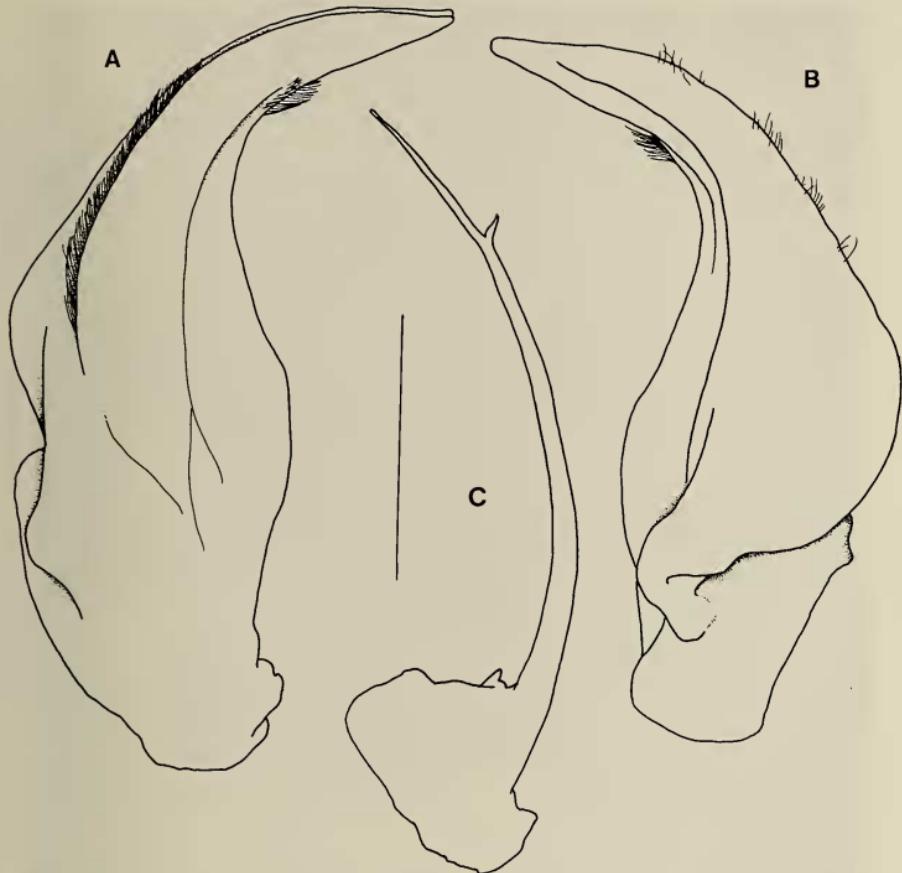


Fig. 3. *Chaceon micronesicus*, new species. Holotype male (150.0 by 147.0 mm) (USNM 221817). A, abdominal face, B, sternal face, left male first pleopod; C, left male second pleopod, sternal face. Scale = 10 mm.

The male first pleopod of *C. micronesicus*, however, is more strongly curved and the distal part is proportionately longer than that of *C. manningi*. Ng et al. (1998) noted that a large male specimen of *C. granulatus* from Taiwan has the distal part of the male first pleopod proportionately longer than typical *C. granulatus* which are smaller, but in *C. micronesicus*, this condition is apparent even for the single small specimen available for study. The abdomens of *C. micronesicus*, *C. granulatus*, and *C. manningi* are shown in Fig. 6.

The comparative material of *C. granulatus* and *C. manningi* examined for this study is listed below. Of all the syntypes of *C. granulatus* examined now in the Nationaal Natuurhistorisch Museum, Leiden only one specimen measuring 138.8 by 124.3 mm and collected from Sagami Bay in Japan is wet-preserved, in good condition and complete. As such, it is here designated as the lectotype of *C. granulatus* (RMNH D-32228).

The ecology and fishery for this species (as *C. granulatus*) has already been treated at length by Hastie & Saunders (1992).

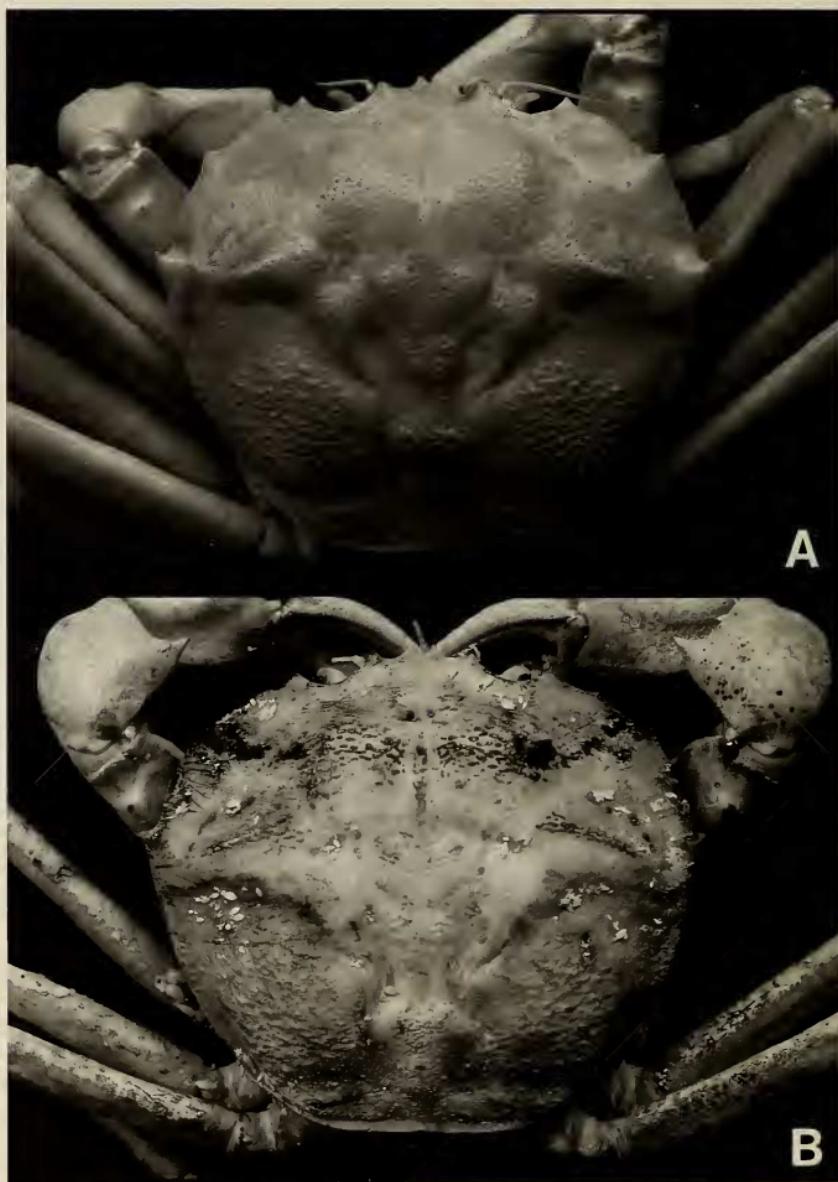


Fig. 4. Carapaces. A, *Chaceon granulatus*, lectotype male (138.8 by 124.3 mm) (RMNH, cat. no. D.32228); B, *C. manningi*, holotype male (185.0 by 159.0 mm) (ZRC, cat. no. 1993.6588).

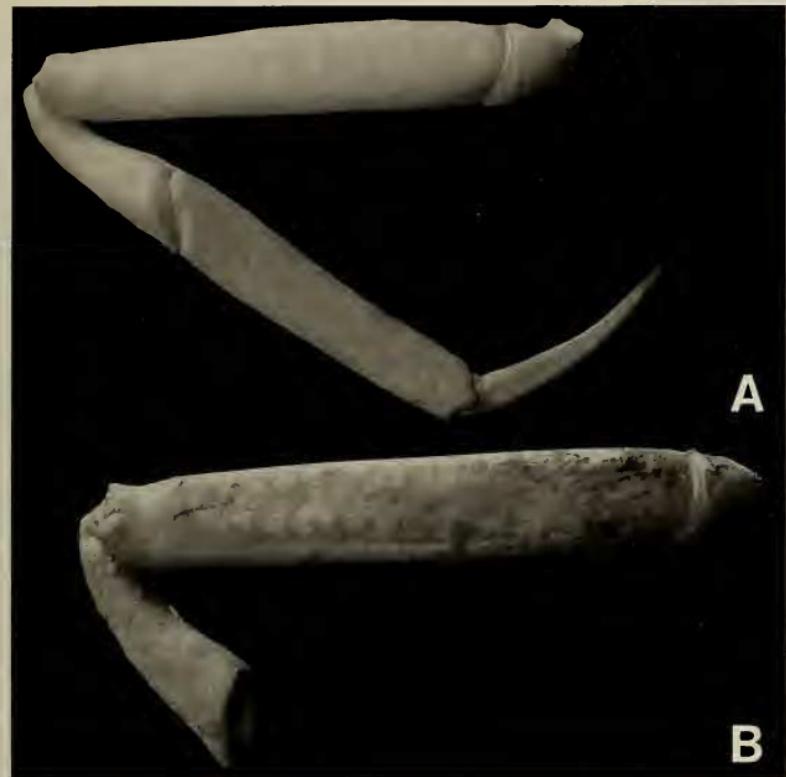


Fig. 5. Left fourth ambulatory legs. A, *Chaceon granulatus*, lectotype male (138.8 by 124.3 mm) (RMNH, cat. no. D.32228); B, *C. manningi*, holotype male (185.0 by 159.0 mm) (ZRC, cat. no. 1993.6588).

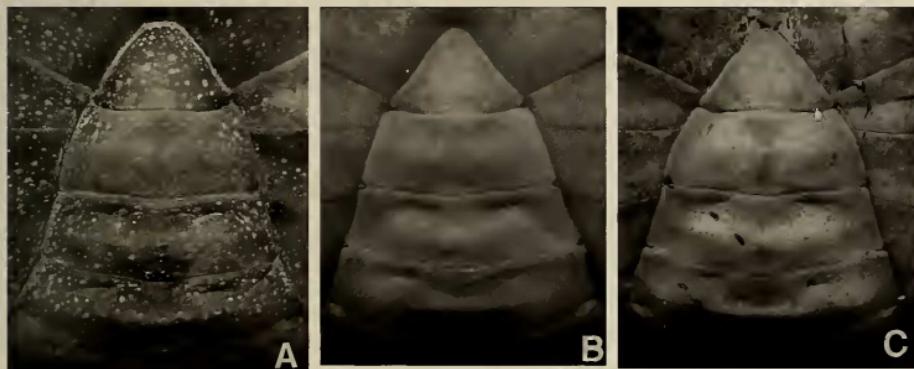


Fig. 6. Male abdomens. A, *Chaceon micronesicus*, new species, holotype male (150.0 by 147.0 mm) (USNM 221817); B, *C. granulatus*, lectotype male (138.8 by 124.3 mm) (RMNH, cat. no. D.32228); C, *C. manningi*, holotype male (185.0 by 159.0 mm) (ZRC, cat. no. 1993.6588).

Comparative material examined.—*Chaceon granulatus*: Lectotype male (138.8 by 124.3 mm) (NNM, cat. No. D-32228), Hayma, Sagami Bay, Kanagawa-ken, Japan, coll. H. Ikeda, 1977–1978.—2 paratypes carapaces only (dried) (NNM, cat. no. D-43810, 43811), Kanagawa-ken, Sagami Bay off Hayama, Japan, coll. H. Ikeda, 1978.—1 male (dried) (177.6 by 179.3 mm) (USNM 32006), Japan, from Ward's National Science Establishment.—1 male (164.0 by 144.3 mm) (ORI), station SE-01, KT-93-09, hydrothermal vent, South Ensei Knoll, Japan, coll. Sep 1993.—1 male (190.0 by 182.0 mm), 1 female (180.0 by 173.0 mm) (NTOU), port at Tai-Chi, I-Lan County, northeastern Taiwan, ca. 450 m depth, sandy-muddy bottom, by inshore commercial trawlers, coll. T. Y. Chan, 2 Nov 1995.—1 male (197.0 by 178.0 mm) (ZRC), 1 male (170.0 by 153.0 mm) (NTOU), probably from deep waters in East or South China Sea, Taiwanese commercial offshore trawlers, coll. P. K. L. Ng, Aug 1996.

Chaceon manningi: Holotype male (185.0 by 159.0 mm) (ZRC, cat. no. 1993.6588), paratype male (187.0 by 167.0 mm) (NTOU, cat. no. 1991-618), Tung-Sa Islands, South China Sea, 438–636 metres depth, coll. D. A. Lee, 13 Jun 1991.—1 male (200.0 by 195.0 mm), 2 females (129.0 by 127.0 mm, 142.0 by 139.0 mm) (NTOU), Tung-Sa Islands, South China Sea, coll. D. A. Lee, no date.—3 males (192.0 by 201.0 mm, 206.0 by 201.0 mm, 158.0 by 155.0 mm) (ZRC), 1 male (193 by 170 mm) (TM), probably from deep waters in East or South China Sea, Taiwanese commercial offshore trawlers, coll. P. K. L. Ng, Aug 1996.—1 male (162.0 by 141.0 mm) (ORI), station HY-04, KT-93-09, hydrothermal vent, Hyuga Nada, Japan.

Key to Pacific species of *Chaceon*

1. Dactylus of ambulatory legs dorsoventrally flattened, height at midlength 0.8 times or less than width at midlength .. 2
— Dactylus of ambulatory legs laterally flattened, height at midlength subequal to or greater than width at midlength (0.9 times and above) .. 6
2. Merus of ambulatory leg with distinct dorsal subdistal spine or tooth .. 3
— Merus of ambulatory leg unarmed, without distinct dorsal subdistal spine or tooth .. 5
3. Anterolateral margins of adults with low, lobiform teeth ..
.... *C. bicolor* Manning & Holthuis, 1989
— Anterolateral margin of adults with spiniform teeth .. 4
4. Dorsal margins of merus and carpus of ambulatory legs smooth; merus of fifth male ambulatory leg 5.9–6.0 times longer than high ..
.... *C. australis* Manning, 1993(b)
— Dorsal margins of merus and carpus of ambulatory legs gently serrated; merus of fifth male ambulatory leg 5.1–5.3 times longer than high ..
.... *C. yaldwyni* Manning, Dawson, & Webber, 1990
5. Anterolateral teeth distinct, sharp, carapace appearing more hexagonal; merus of male fifth ambulatory leg 4.3–4.4 times longer than high ..
.... *C. imperialis* Manning, 1992
— Anterolateral teeth very low, carapace appearing very rounded; merus of male fifth ambulatory leg 5.1–6.0 times longer than high ..
.... *C. pouponi* Manning, 1992
6. Outer surface of chelipedal carpus with spine or projection; merus of ambulatory legs with distinct dorsal subdistal spine or tooth ..
.... *C. karubar* Manning, 1993(a)
— Outer surface of chelipedal carpus unarmed; merus of ambulatory legs unarmed, without distinct dorsal subdistal spine or tooth .. 7
7. Merus of male fifth ambulatory leg 4.6–5.1 times longer than high .. *C. granulatus*
— Merus of male fifth ambulatory leg 5.2–5.6 times longer than high .. 8
8. Metabranchial regions low; posterolateral margins almost straight; not distinctly swollen ..
.... *C. micronesicus*, new species
— Metabranchial regions swollen; posterolateral margins distinctly convex ..
.... *C. manningi*

Acknowledgments

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Literature Cited

Hastie, L. C., & W. B. Saunders. 1992. On the distribution and fishery potential of the Japanese Red crab *Chaceon granulatus* in the Palauan Archipelago, Western Caroline Islands.—Marine Fisheries Review 54:26–32.

Manning, R. B. 1992. Two new species of the deep-sea crab genus *Chaceon* from the Pacific Ocean (Crustacea: Decapoda: Brachyura).—Bulletin du Muséum national d'Histoire Naturelle, Paris (4)14(A1):209–215.

—. 1993a. A new deep-sea crab, genus *Chaceon*, from Indonesia (Crustacea: Decapoda: Geryonidae).—Raffles Bulletin of Zoology 41:169–172.

—. 1993b. A new deep-sea crab, genus *Chaceon*, from the Austral Islands, southwestern Pacific Ocean (Decapoda: Geryonidae).—Crustacean Research 22:7–10.

—, E. W. Dawson, & R. W. Webber. 1990. A new species of *Chaceon* from New Zealand (Crustacea: Decapoda: Geryonidae).—Proceedings of the Biological Society of Washington 103:602–607.

—, & L. B. Holthuis. 1989. Two new genera and nine new species of geryonid crabs (Crustacea: Decapoda: Geryonidae).—Proceedings of the Biological Society of Washington 102:50–77.

Miyake, S. 1982. Japanese crustacean decapods and stomatopods in color. Vol. 1. Macrura, Anomura and Stomatopoda. Hoikusha Publishing Company, Osaka, 261 pp., 56 color pls.

Motteler, L. S. 1986. Pacific Island names.—Bishop Museum Miscellaneous Publication 34:1–91.

Ng, P. K. L., T. Y. Chan, & S. H. Tan. 1998. The deep water geryonid crab, *Chaceon granulatus* (Sakai) in Taiwan: first record of the family, with notes on the species.—Crustaceana (in press).

—, D.-A. Lee, & H.-P. Yu. 1994. A new deep sea crab of the genus *Chaceon* (Decapoda, Geryonidae) from the South China sea.—Crustaceana, 67:371–380.

Sakai, T. 1978. Decapod Crustacea from the Emperor or Seamount Chain.—Researches on Crustacea, Carcinological Society of Japan 8:1–39, pls. 1–4.

Tung, Y.-M., Y.-S. Chen, F.-Z. Wang, B.-Y. Wang, & Z.-C. Li. 1988. Report on the crustaceans of the deep East China Sea. Hangzhou University Publications, 132 pp. [In Chinese.]